

# Hydrogen-rich Interpenetrating Polymer Networks for Radiation-Shield Structures, Phase I

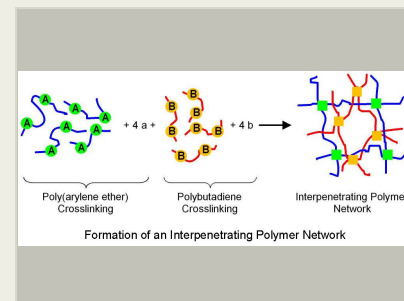
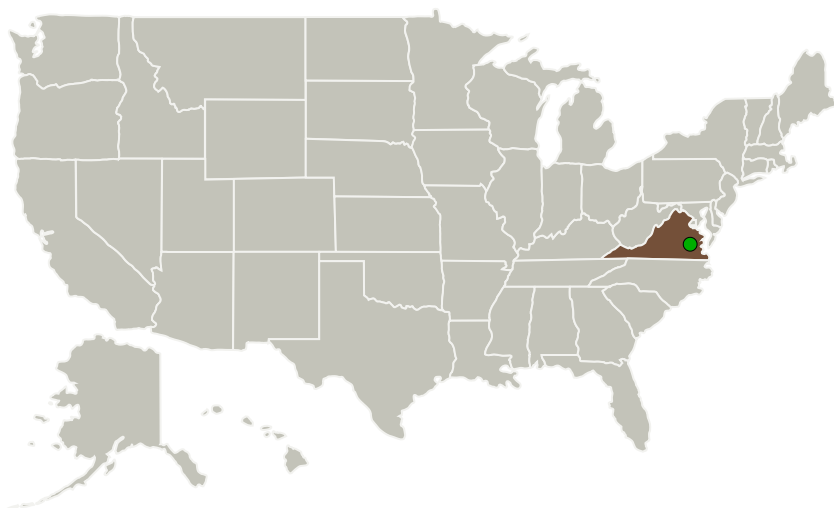
Completed Technology Project (2015 - 2015)



## Project Introduction

In Sub-topic H11.01, NASA has identified a need for advanced radiation-shielding materials and structures to protect humans from space radiation during NASA missions. The radiation species of greatest interest are light ions (particularly protons), heavy ions (such as iron-56) and neutrons. International Scientific Technologies, Inc., in conjunction with The College of William and Mary, proposes the development of hydrogen-rich interpenetrating polymer networks as radiation shields. The program Technical Objectives include selection and design of interpenetrating polymer networks for use in radiation shields, synthesis of interpenetrating polymer networks tailored to function as radiation shields as well as structural components, and measurement and test of interpenetrating polymer network materials for radiation-shielding effectiveness and other multifunctional properties. The innovation is the development of interpenetrating polymer networks for structural radiation-shielding materials to protect humans on NASA missions. The anticipated result is a combination of high-performance aromatic polymers with hydrogen-rich aliphatic polymers to create composite materials that combine the structural properties of the high-performance polymers with increased shielding effectiveness of the hydrogen-rich polymers. The proposed materials have multifunctional properties of radiation shielding against galactic cosmic radiation, neutrons and electromagnetic radiation, and structural integrity to permit use in flexible and rigid structures and habitats.

## Primary U.S. Work Locations and Key Partners



Hydrogen-rich Interpenetrating Polymer Networks for Radiation-Shield Structures, Phase I

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Organizations Performing Work	Role	Type	Location
International Scientific Technologies, Inc.	Lead Organization	Industry	Dublin, Virginia
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

## Primary U.S. Work Locations

Virginia

## Project Transitions

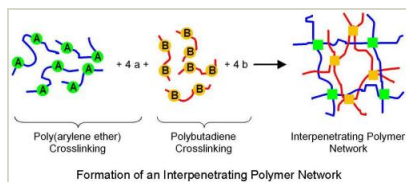
**June 2015:** Project Start**December 2015:** Closed out

**Closeout Summary:** Hydrogen-rich Interpenetrating Polymer Networks for Radiation-Shield Structures, Phase I Project Image

### Closeout Documentation:

- Final Summary Chart Image(<https://techport.nasa.gov/file/139096>)

## Images



### Briefing Chart Image

Hydrogen-rich Interpenetrating Polymer Networks for Radiation-Shield Structures, Phase I  
(<https://techport.nasa.gov/image/129813>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

International Scientific Technologies, Inc.

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

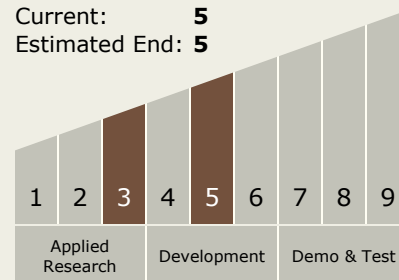
### Program Manager:

Carlos Torrez

### Principal Investigator:

Russell J Churchill

## Technology Maturity (TRL)

Start: **3**Current: **5**Estimated End: **5**

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## Technology Areas

### Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - └ TX06.5 Radiation
    - └ TX06.5.3 Protection Systems

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System